Name:

at1124exam: Radicals and Squares (v916)

Question 1

Simplify the radical expressions.

$\sqrt{99}$ $\sqrt{75}$ $\sqrt{44}$

$\sqrt{3 \cdot 3 \cdot 11}$ $\sqrt{5 \cdot 5 \cdot 3}$ $\sqrt{2 \cdot 2 \cdot 11}$

$3\sqrt{11}$ $5\sqrt{3}$ $2\sqrt{11}$

Question 2

Find all solutions to the equation below:

$$3\left((x-4)^2-7\right) \;=\; 87$$

First, divide both sides by 3.

$$(x-4)^2-7=29$$

Then, add 7 to both sides.

$$(x-4)^2=36$$

Undo the squaring. Remember the plus-minus symbol.

$$x-4=\pm 6$$

Add 4 to both sides.

$$x=4\pm 6$$

So the two solutions are $x=10$ and $x=-2$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 8x \;=\; -7$$

$$x^2 - 8x + 16 = -7 + 16$$
$$x^2 - 8x + 16 = 9$$
$$(x-4)^2 = 9$$
$$x - 4 = \pm 3$$
$$x = 4 \pm 3$$
$$x = 7 \qquad \text{or} \qquad x = 1$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y \;=\; a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y \;=\; 3x^2 - 24x + 39$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 - 8x) + 39$$

We want a perfect square. Halve -8 and square the result to get 16 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 - 8x + 16 - 16) + 39$$

Factor the perfect-square trinomial.

$$y = 3((x-4)^2 - 16) + 39$$

Distribute the 3.

$$y = 3(x-4)^2 - 48 + 39$$

Combine the constants to get **vertex form**:

$$y = 3(x-4)^2 - 9$$

The vertex is at point $(4, -9)$.